IN THE UNITED STATES
PATENT AND TRADEMARK OFFICE

Appl. No.	:	10/538,202
Applicant	:	Chin CHANG
Filed	:	09 June 2005
TC/A.U.	:	2624
Confirmation	:	1798
Examiner	:	ABDI, Amara
Atty. Docket	:	US-020504

Title: TRANSFORMATION STRUCTURES FOR APPROXIMATING COLOR MATCHING FUNCTIONS

APPEAL BRIEF

U.S. Patent and Trademark Office
Customer Window, Mail Stop **Appeal Brief - Patents**
Randolph Building
401 Dulany Street
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Sir:

In response to the FINAL Office Action dated 12 May 2008 and Advisory Action dated 29 July 2008, finally rejecting pending claims 1, 2, 9, 10 and 17-19, and in support of the Notice of Appeal filed on 11 August 2008, Applicant hereby respectfully submits this Appeal Brief.

REAL PARTY IN INTEREST

According to an assignment recorded at Reel 017044, Frame 0928, Koninklijke Philips Electronics N.V., owns all of the rights in the above-identified U.S. patent application.

RELATED APPEALS AND INTERFERENCES

There are no other appeals or interferences related to this application or to any

related application, nor will the disposition of this case affect, or be affected by, any other application directly or indirectly.

STATUS OF CLAIMS

Claims 1-20 are pending in the application.

Claims 3-8, 11-16 and 20 are each objected to as depending from a rejected base claim, but have been indicated to define patentable subject matter and would be allowable if rewritten in independent form including all features of their respective base claims, and any intervening claims.

Accordingly, the claims on appeal are claims 1, 2, 9, 10 and 17-19.

STATUS OF AMENDMENTS

There are no pending amendments with respect to this application.

SUMMARY OF CLAIMED SUBJECT MATTER

The present invention is directed to a system and method for determining an RGB filter set and color estimation performance for RGB LED color sensing.[1]

Accordingly, as broadly recited in claim 1, a method is provided for determining RGB filter set and color estimation performance for RGB LED color sensing. The method comprises: constructing a criteria function describing an error between desired color matching functions and a spectral response of an RGB filter set (FIG. 2 – step 210; page 3, lines 31-32); determining RGB filter set response characteristics step based on the criteria function (FIG. 2 – step 220; page 4, lines 12-13); and determining color estimation parameters for substantially optimal color estimation with the RGB filter set based upon the determined RGB filter set response

1 In the description to follow, citations to various reference numerals, figures, and corresponding text in the specification are provided solely to comply with Patent Office rules. It should be understood that these reference numerals, figures, and text are exemplary in nature, and not in any way limiting of the true scope of the claims. It would therefore be improper to import anything into any of the claims simply on the basis of **exemplary** language that is provided here only under the obligation to satisfy Patent Office rules for maintaining an Appeal.

characteristics (FIG. 2 – step 230; page 4, lines 20-22).

As further featured in claim 2, determining the RGB filter response characteristics comprises evaluating the criteria function to determine the RGB filter response characteristics resulting in a minimum value of a constraint set criteria function (page 4, lines 14-19).

As broadly recited in claim 9, a computer readable medium (FIG. 4 – elements 440, 460 & 470; page 6, lines 25-26 and page 7, lines 1-5) stores a computer program. The computer readable medium comprises computer readable code for constructing a criteria function describing an error between desired color matching functions and a spectral response of an RGB filter set (FIG. 2 – step 210; page 3, lines 31-32); computer readable code for determining RGB filter set response characteristics based on the criteria function (FIG. 2 – step 220; page 4, lines 12-13); and computer readable code for determining color estimation parameters for substantially optimal color estimation with the RGB filter set based upon the determined RGB filter set response characteristics (FIG. 2 – step 230; page 4, lines 20-22).

As further featured in claim 10, when the annotation mode is selected, the cursor location is not changed (page 3, lines 23-25; page 6, lines 7 and 20-21).

As broadly recited in claim 17, a system for determining RGB filter set and color estimation performance for RGB LED color sensing comprises: means (FIG. 4 – 400; page 7, lines 31-32) for constructing a criteria function describing an error between desired color matching functions and a spectral response of an RGB filter set ; means (FIG. 4 – 400; page 7, lines 32-34) for determining RGB filter set response characteristics based on the criteria function; and means (FIG. 4 – 400; page 7, line 34 – page 8, line 5) for determining color estimation parameters for substantially optimal color estimation with the RGB filter set based upon the determined RGB filter set response characteristics.

As further featured in claim 18, the system comprises means (FIG. 4 – 400; page 7, lines 33-34 and page 5, lines 11-16) for constructing spectral approximation functions $\hat{x}$, $\hat{y}$, and $\hat{z}$ for the RGB LED light sources from the M and n determined by

evaluating the criteria function.

As further featured in claim 19, the system comprises means (FIG. 4 – 400; page 7, line 34 – page 8, line 2 and page 5, lines 17-24) for determining estimated tristimulus values for the RGB LED light sources based upon the spectral approximation functions.

GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL

The grounds of rejection to be reviewed on Appeal are: (1) the rejections of claims 1-2, 9-10 and 17 under 35 U.S.C. § 103 over Giorgianni et al. U.S. Patent 5,609,978 ("Giorgianni") in view Meynants et al. U.S. Patent 6,833,868 ("Meynants"); and (2) the rejections of claims 18 and 19 under 35 U.S.C. § 103 over Giorgianni in view of Meynants and further in view of Guimaraes et al. U.S. Patent Publication 2003/0156214 ("Guimaraes").

ARGUMENTS

(1) Claims 1-2, 9-10 and 17 are Patentable over Giorgianni and Meynants

Claim 1

Among other things, the method of claim 1 includes constructing a criteria function describing an error between desired color matching functions and a spectral response of an RGB filter set.

Applicant respectfully submits that no combination of the cited references teaches or suggests constructing a criteria function describing an error between desired color matching functions and a spectral response of an RGB filter set.

In the FINAL Office Action, the Examiner states that:

> (1) Giorgianni discloses the RBG filter set in "Equation 12" at col. 7, lines 55-60 as a "MacAdam's Filter" and also discloses the RGB filter set in FIG. 11, at col. 11, lines 35-41 and in columns 27-30, and the "MacAdam's Filter" could be read as the RBG filter of claim 1;
>
> (2) Giorgianni discloses the desired color matching functions as "*the aim*

CIELAB values" at col. 7, lines 1-7; and

(3) Giorgianni discloses constructing a criteria function in "Equation 15" a*s a criteria function DELTA.E*.sub.ab as shown in Table 1, Entry 7.*"

Applicant respectfully disagrees.

(1) Regarding the recited RGB filter set . . .

Giorgianni pertains to a photographic film which can be scanned to produce a colorimetrically accurate electronic image. More specifically, Giorgianni aims to provide a photographic film with improved colorimetric accuracy. See Abstract, col. 11, lines 63-65, col. 15, lines 33-40, claims 1-19, etc.

"Equation 12," FIG. 11, and col. 11, lines 35-41 in Giorgianni all pertain to the MacAdam spectral sensitivities. These are theoretical mathematic equations. They are not spectral response of any actual RGB filter set (or even of any color photographic films, which is what Giorgianni is concerned with). Indeed, Table 1 compares colorimetric accuracy of a number of actual color films to the theoretically "perfect" accuracy of the MacAdam spectral sensitivities.

Cols. 27-30 in Giorgianni, cited very generally by the Examiner, disclose a lot of things, but they do not disclose the recited RGB filter set.

(2) Regarding the desired color matching functions . . .

Giorgianni merely discloses at col. 7, lines 1-7 the well-known standard mathematical equations for converting CIE 1931 XYZ tristimulus color space values to CIE 1976 (L*, a*, b*) color space (also called CIELAB) values. These standard equations can be found, for example, in Wikipedia under an article entitled "Lab Color Space." In particular, the equations at col. 7, lines 1-7 in Giorgianni just convert CIE 1931 XYZ tristimulus values for a defined set of 190 "color patches" of known spectral reflectance (see Appendix A of Giorgianni), into CIE 1976 tristimulus values for the same color patches.

The CIE1931-to-CIE-1976 conversion equations at col. 7, lines 1-7 are not "*desired color matching functions*."

(3) <u>Regarding constructing a criteria function describing an error between desired color matching functions and a spectral response of an RGB filter set</u> . . .

As best as Applicant can understand, the "Equation 15" to which the Examiner refers is the equation at the top of col. 8 in <u>Giorgianni</u>.

That equation specifies the difference between the transformed CIE 1976 CIELAB coordinates of a test color corresponding to one of the test patches in Appendix A, and the CIE 1976 CIELAB coordinates "*corresponding to a specific transformation of the exposure signals recorded by the photographic element*" (col. 5, lines 45-51) (e.g., using defined phosphor and exposure matrices *P* and *M* (<u>see</u> col. 7, lines 12-60).

The equation is not a criteria function describing an error between desired color matching functions and the spectral response of any RGB filter set.

Therefore, Applicant submits that no combination of <u>Giorgianni</u> and <u>Meynants</u> could produce the method of claim 1.

Also, the method of claim 1 includes determining RGB filter set response characteristics "*based on the criteria function*."

The Examiner claims that <u>Giorgianni</u> discloses that the MacAdam spectral sensitivities correspond to the RGB filter set of claim 1.

The MacAdam spectral sensitivities are not dependent on, or determined by, any criteria function. They are specific predefined curves that are known in the art. More specifically, <u>Giorgianni</u> certainly does not disclose determining the MacAdam spectral sensitivities based on "equation 15" at the top of col. 8.

Perhaps recognizing this problem, the Examiner also cites col. 31, lines 46-51 in <u>Giorgianni</u>.

However, col. 31, lines 46-51 do not even mention the MacAdam spectral sensitivities that the Examiner claims correspond to the RGB filter set of claim 1. Col. 31, lines 46-51 disclose using a photographic element in combination with an optical filter such that the combination produces a desired set of spectral sensitivities.

The cited text makes no mention of any **<u>RGB</u>** filter set. Indeed, it is difficult to

fathom how an RGB filter set could be physically deployed with the disclosed photographic element to produce a useful image. The fact that an RGB filter set is not contemplated by Giorgianni is easily seen from inspecting the equations at the bottom of column 31 which clearly show that the exact same "optical filter" function sensitivity curve would be multiplied by each of the red, green, and blue sensitivity curves of the photographic element itself. Furthermore, the detailed discussion of suitable filters by Giorgianni at col. 32, lines 9-38 makes no mention or suggestion of any RGB filter set, and indeed contemplates the use of optical filters that pass all colors of the spectrum to the various emulsions of the photographic element.

Furthermore, the cited text also certainly does not disclose determining any RGB filter set response characteristics based on a criteria function. The text merely states that the effective spectral sensitivity curves of the combination of optical filter and photographic element can be combined or measured, and then these effective sensitivity curves can be used to calculate an average color error with respect to CIE 1976, and a noise gain factor.

Therefore, again, Applicant submits that no combination of Giorgianni and Meynants could produce the method of claim 1.

Furthermore, Applicant respectfully traverses the proposed combination of Giorgianni and Meynants because it fails to comply with the analysis required by KSR International Co. v. Teleflex Inc., 550 U.S. ___, 82 USPQ2d 1385 (2007) ("KSR") in order to establish a *prima facie* case of obviousness.

At the outset, the Examiner fails to establish the level of skill of one of ordinary skill in the art at the time the invention was made. See M.P.E.P. § 2141.03.

Furthermore, the Examiner fails to provide any evidence or rational underpinnings for the proposed reason for the proposed combination. The purported rationale articulated by the Examiner for the proposed combination make no sense. The Examiner states that:

> "*it would have been obvious to one having ordinary skill in the art at the time the invention was made to use the system of Meynants et al., where estimating pixels chrominance, in the system of Giorgianni et al.*

> *in order to deliver a performance image quality and at the same time the system is implementable in a sufficiently sized small circuit allowing the construction of a single chip CMOS based color imaging device.*"

The Examiner has clearly just cribbed Meynants' "AIM OF THE INVENTION" at col. 2, lines 23-27 as a supposed reason for the proposed combination. Just as clearly, this makes no sense. Giorgianni is concerned with providing a photographic film with improved colorimetric accuracy. It does not disclose or pertain to any "CMOS based color imaging device," and so nothing in Meynants could allow anything in Giorgianni to be "implementable in a sufficiently small circuit" or constructed as "a single chip CMOS based color imaging device." Not only is there no apparent reason for the proposed "combination," but Applicant submits that such a "combination" is not even possible since Meynants discloses a method of correcting color values for RGB pixels in a solid state imaging device, while Giorgianni does not have any solid state imaging device with pixels.

The Examiner also states that:

> "*it would have been obvious to one having ordinary skill in the art to use the color estimation parameters as thought* (sic) *by Meynants et al., with the criteria function as shown by Giorgianni et al. since the color estimation parameters could be used in combination with the criteria function to achieve the predictable results of delivering a performance image quality and at the same time the system is implementable in a sufficiently sized small circuit allowing the construction of a single chip CMOS based color imaging device.*"

However, a rejection on obviousness grounds under 35 U.S.C. § 103 cannot be sustained by mere conclusory statements: instead there must be some articulated reasoning with some rational underpinning to support the legal conclusion of obviousness. In re Kahn, 441 F.3d 977, 988, 78 USPQ2d 1329, 1336 (Fed. Cir. 2006). See also KSR 82 USPQ2d at 1396 (2007) (quoting Federal Circuit statement

with approval).

Not only does the Examiner fail to provide any evidence or reason as to why he believes that the proposed combination would "achieve the predictable results" he proposes, but Applicant respectfully submits that it would not produce those results, for the reasons set forth in detail above.

Accordingly, for at least these reasons, Applicant respectfully submits that claim 1 is patentable over the cited art

Claim 2

Claim 2 depends from claim 1 and is deemed patentable for at least the reasons set forth above with respect to claim 1, and for the following additional reason.

Among other things, the method of claim 2 includes determining the RGB filter response characteristics by evaluating the criteria function to determine the RGB filter response characteristics resulting in a minimum value of a constraint set criteria function.

Applicant respectfully submits that this is not disclosed or suggested by the cited art.

The Examiner cites col. 15, lines 61-67 and states that:

"*the minimum value* (sic) *a constraint set criteria function is read as 3.1*"

Col. 15, lines 61-67 state that Giorgianni employs photographic films whose spectral sensitivities produce a colorimetric difference - as calculated according to Giorgianni's specific algorithm - is less or equal to than 3.1.

Col. 15, lines 61-67 do not disclose determining any the RGB filter response characteristics. Col. 15, lines 61-67 do not disclose that 3.1 is a "minimum value" of anything (indeed, to the contrary, the text discloses that 3.1 is the maximum value of the colorimetric difference - as calculated according to Giorgianni's specific algorithm – that Giorgianni's photographic films will produce). Col. 15, lines 61-67 do not disclose determining any the RGB filter response characteristics by minimizing anything. Col. 15, lines 61-67 do not disclose determining any the RGB filter

response characteristics by evaluating the criteria function to determine the RGB filter response characteristics resulting in a minimum value of a constraint set criteria function. Col. 15, lines 61-67 do not disclose the features of claim 2.

Accordingly, for at least these additional reasons, Applicant respectfully submits that claim 2 is patentable over the cited art.

Claim 9

Claim 9 is directed to a computer readable medium storing a computer program comprising computer readable code for executing the method of claim 1.

Accordingly, claim 9 is deemed patentable over any combination of Giorgianni and Meynants for at least the reasons set forth above with respect to claim 1.

Claim 10

Claim 10 depends from claim 9 and is deemed patentable for at least the reasons set forth above with respect to claim 9, and also for similar reasons to those set forth above with respect to claim 2.

Claim 17

Among other things, the system of claim 17 includes means for determining RGB filter set response characteristics based on the criteria function and means for constructing a criteria function describing an error between desired color matching functions and a spectral response of an RGB filter set, and means for determining RGB filter set response characteristics based on the criteria function.

As explained in detail above with respect to claim 1, the cited art does not disclose these features.

Accordingly, for at least these reasons, Applicant respectfully submits that claim 17 is patentable over any combination of Giorgianni and Meynants.

(2) Claims 18-19 are Patentable over Giorgianni, Meynants & Guimaraes

Claims 18 and 19

Claims 18 and 19 depend from claim 17. Applicant respectfully submits that Guimaraes does not remedy the shortcomings of Giorgianni & Meynants as set forth above with respect to claim 17, so claims 18-19 are deemed patentable for at least the same reasons as claim 17.

CONCLUSION

For all of the foregoing reasons, Applicant submits that claims 1, 2, 9, 10 and 17-19 are all patentable over the cited prior art. Therefore, Applicant respectfully requests that the rejections of claims 1, 2, 9, 10 and 17-19 be withdrawn, the claims be allowed, and the application be passed to issue.

Respectfully submitted,

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CLAIMS APPENDIX

1. (Original) A method for determining RGB filter set and color estimation performance for RGB LED color sensing, the method comprising:

constructing a criteria function describing an error between desired color matching functions and a spectral response of an RGB filter set;

determining RGB filter set response characteristics based on the criteria function; and

determining color estimation parameters for substantially optimal color estimation with the RGB filter set based upon the determined RGB filter set response characteristics.

2. (Original) The method of claim 1 wherein determining the RGB filter response characteristics comprises evaluating the criteria function to determine the RGB filter response characteristics resulting in a minimum value of a constraint set criteria function.

3. (Original) The method of claim 2 wherein the criteria function is represented by the equation:

$$\underset{\mathrm{M,n}}{J} = \int_{\sigma} \left| \begin{bmatrix} R_{LED}(\lambda) & 0 & 0 \\ 0 & G_{LED}(\lambda) & 0 \\ 0 & 0 & B_{LED}(\lambda) \end{bmatrix} \left\| \begin{bmatrix} \overline{xmc}(\lambda) \\ \overline{ymc}(\lambda) \\ \overline{zmc}(\lambda) \end{bmatrix} - M \begin{bmatrix} r(\lambda) \\ g(\lambda) \\ b(\lambda) \end{bmatrix} - n \right| d\lambda$$

wherein $r(\lambda)$, $g(\lambda)$ and $b(\lambda)$ are positive real continuous sensitivity functions of the RGB filter set wherein $\lambda \in \sigma$ = [380, 780] nm and wherein $R_{LED}(\lambda)$, $G_{LED}(\lambda)$ and $B_{LED}(\lambda)$ are the spectra of red, green and blue LED light sources and wherein $\overline{xmc}(\lambda), \overline{ymc}(\lambda), and\ \overline{zmc}(\lambda)$ are a set of color matching functions and wherein M is a 3x3 constant matrix and n is a 3x1 constant vector.

4. (Original) The method of claim 3 further comprising:

constructing spectral approximation functions $\hat{x}$, $\hat{y}$, and $\hat{z}$ for the RGB LED light sources from the *M* and *n* determined by evaluating the criteria function.

5. (Original) The method of claim 4 wherein the spectral approximation functions are represented by the equation:

$$\begin{bmatrix} \hat{x} \\ \hat{y} \\ \hat{z} \end{bmatrix} = (M \begin{bmatrix} r(\lambda) \\ g(\lambda) \\ b(\lambda) \end{bmatrix} + n) * u\{M \begin{bmatrix} r(\lambda) \\ g(\lambda) \\ b(\lambda) \end{bmatrix} + n\}$$ and

wherein *u* is a step function.

6. (Original) The method of claim 5 further comprising:
determining estimated tristimulus values for the RGB LED light sources based upon the spectral approximation functions.

7. (Original) The method of claim 6 wherein the estimated tristimulus values $\hat{X}, \hat{Y}, \hat{Z}$ are determined according to the relationship represented by the equation:

$$\begin{bmatrix} \hat{X} \\ \hat{Y} \\ \hat{Z} \end{bmatrix} = \int_{\sigma} \begin{bmatrix} \hat{x}(\lambda) \\ \hat{y}(\lambda) \\ \hat{z}(\lambda) \end{bmatrix} P(\lambda) d\lambda$$

wherein $P(\lambda) = R_{LED}(\lambda) + G_{LED}(\lambda) + B_{LED}(\lambda)$.

8. (Original) The method of claim 7 further comprising:

implementing a color sensing color calibration through the function represented by the equation:

$$\begin{bmatrix} X \\ Y \\ Z \end{bmatrix} = M_{cal} Mc^{-1} \begin{bmatrix} \hat{X} \\ \hat{Y} \\ \hat{Z} \end{bmatrix}$$

wherein *X, Y and Z* are tristimulus functions of the RGB LED illuminants and wherein M_{cal} is a calibration matrix and wherein Mc^{-1} is an inverse MacAdam's matrix.

9. (Original) A computer readable medium storing a computer program comprising:

computer readable code for constructing a criteria function describing an error between desired color matching functions and a spectral response of an RGB filter set;

computer readable code for determining RGB filter set response characteristics based on the criteria function; and

computer readable code for determining color estimation parameters for substantially optimal color estimation with the RGB filter set based upon the determined RGB filter set response characteristics.

10. (Original) The computer readable medium of claim 9 wherein determining the RGB filter response characteristics comprises evaluating the criteria function to determine the RGB filter response characteristics resulting in a minimum value of a constraint set criteria function.

11. (Original) The computer readable medium of claim 10 wherein the criteria function is represented by the equation:

$$\underset{\mathrm{M,n}}{J} = \int_{\sigma} \left| \begin{bmatrix} R_{LED}(\lambda) & 0 & 0 \\ 0 & G_{LED}(\lambda) & 0 \\ 0 & 0 & B_{LED}(\lambda) \end{bmatrix} \left[\begin{bmatrix} \overline{xmc}(\lambda) \\ \overline{ymc}(\lambda) \\ \overline{zmc}(\lambda) \end{bmatrix} - M \begin{bmatrix} r(\lambda) \\ g(\lambda) \\ b(\lambda) \end{bmatrix} - n \right] \right| d\lambda$$

wherein $r(\lambda)$, $g(\lambda)$ and $b(\lambda)$ are positive real continuous sensitivity functions of the RGB filter set wherein $\lambda \in \sigma$ = [380, 780] nm and wherein $R_{LED}(\lambda)$, $G_{LED}(\lambda)$ and $B_{LED}(\lambda)$ are the spectra of red, green and blue LED light sources and wherein $\overline{xmc}(\lambda), \overline{ymc}(\lambda), and\ \overline{zmc}(\lambda)$ are a set of color matching functions and wherein M is a 3x3 constant matrix and n is a 3x1 constant vector.

12. (Original) The computer readable medium of claim 11 further comprising:

computer readable code for constructing spectral approximation functions $\hat{x}$, $\hat{y}$, and $\hat{z}$ for the RGB LED light sources from the *M* and *n* determined by evaluating the criteria function for the RGB filter set.

13. (Original) The computer readable medium of claim 12 wherein the spectral approximation function equation is:

$$\begin{bmatrix} \hat{x} \\ \hat{y} \\ \hat{z} \end{bmatrix} = (M \begin{bmatrix} r(\lambda) \\ g(\lambda) \\ b(\lambda) \end{bmatrix} + n) * u\{M \begin{bmatrix} r(\lambda) \\ g(\lambda) \\ b(\lambda) \end{bmatrix} + n\}$$

wherein *u* is a step function.

14. (Original) The computer readable medium of claim 13 further comprising:

computer readable code for determining estimated tristimulus values for the RGB LED light sources based upon the spectral approximation functions.

15. (Original) The computer readable medium of claim 14 wherein the estimated tristimulus values $\hat{X}$, $\hat{Y}$, $\hat{Z}$ are determined according to the relationship represented by the equation:

$$\begin{bmatrix} \hat{X} \\ \hat{Y} \\ \hat{Z} \end{bmatrix} = \int_{\sigma} \begin{bmatrix} \hat{x}(\lambda) \\ \hat{y}(\lambda) \\ \hat{z}(\lambda) \end{bmatrix} P(\lambda) d\lambda$$

wherein $P(\lambda) = R_{LED}(\lambda) + G_{LED}(\lambda) + B_{LED}(\lambda)$.

16. (Original) The computer readable medium of claim 15 further comprising:

computer readable code for implementing a color sensing color calibration through the function represented by the equation:

$$\begin{bmatrix} X \\ Y \\ Z \end{bmatrix} = M_{cal} Mc^{-1} \begin{bmatrix} \hat{X} \\ \hat{Y} \\ \hat{Z} \end{bmatrix}$$

wherein *X, Y and Z* are tristimulus functions of the RGB LED illuminants and wherein M_{cal} is a calibration matrix and wherein Mc^{-1} is an inverse MacAdam's matrix.

17. (Original) A system for determining RGB filter set and color estimation performance for RGB LED color sensing comprising:

means for constructing a criteria function describing an error between desired color matching functions and a spectral response of an RGB filter set;

means for determining RGB filter set response characteristics based on the criteria function; and

means for determining color estimation parameters for substantially optimal color estimation with the RGB filter set based upon the determined RGB filter set response characteristics.

18. (Original) The system of claim 17 further comprising:

means for constructing spectral approximation functions $\hat{x}$, $\hat{y}$, and $\hat{z}$ for the RGB LED light sources from the M and n determined by evaluating the criteria function.

19. (Original) The system of claim 18 further comprising:

means for determining estimated tristimulus values for the RGB LED light sources based upon the spectral approximation functions.

20. (Original) The system of claim 19 further comprising:

means for implementing a color sensing color calibration through the function represented by the equation:

$$\begin{bmatrix} X \\ Y \\ Z \end{bmatrix} = M_{cal} Mc^{-1} \begin{bmatrix} \hat{X} \\ \hat{Y} \\ \hat{Z} \end{bmatrix}$$

wherein *X, Y and Z* are tristimulus functions of the RGB LED illuminants and wherein M_{cal} is a calibration matrix and wherein Mc^{-1} is an inverse MacAdam's matrix.

EVIDENCE APPENDIX

{None}

RELATED PROCEEEDINGS APPENDIX

{None}